

modular equation, & I expect
to be able to reproduce the
result by the above transcendental
method - but I am afraid
the case $n=11$ is too complicated
to be completely brought
out by either of the two
methods. I am afraid I shall
never be able to do this.

Cambridge 19th March 1873.

I am uncertain whether I
ought to direct Posen or
Heidelberg, but assume
that either will find you.

$8^{+0} 8^{+0} A$

Dear Sir, I have to thank you very
much for your letter: Since I
wrote I see my way much better
to the theory. Taking n as an odd
prime and writing

$$\frac{1-y}{1+y} = \frac{1-x}{1+x} \left(\frac{\alpha + \beta x + \gamma x^2 + \dots}{\alpha + \beta x + \gamma x^2 + \dots} \right)$$

or say for convenience $\alpha=1$, (β
is then connected with M by the
equation $\frac{1}{M} = 1 + 2\beta$) to each of the
 $n+1$ values of β , there corresponds
a single value of γ , & taking
f any positive integer
value u can be shown nearly
as good as in regard to M , the
steps, so that each of these
rational and integral functions

of u , of the form $Au^\alpha + Bu^{\alpha+\beta} + \delta$; the form of these can be further determined; and their degrees ascertained by the transformation $\frac{1}{u}, \frac{1}{v}$ for v, u : finally $u, v, \beta, \gamma \dots$ are all of them given as functions of q , and it is hence theoretically possible to determine the coefficients. We have thus $S\beta, S^2\beta, \dots S^{n-1}\beta$, all of them as rational & integral functions of u ; and the like for γ, δ, δ ; hence $\beta, \gamma \dots$ will be determined each of them as a rational fraction, the numerator being a rational and integral function of u, v ; and the denominator being in each case $I(u)$. If $I(u, v)$ is the modular equation.

I was aware (from your memoir) of the method of finding a rational expression for M , by means of the given expression of M^2 , and the multiplier equation; but the degrees of the numerator and denominator as thus obtained are certainly far too high: the method above referred to gives an expression for β , that is in effect for M , where the degrees are lower.

I have investigated the case $n=7$ algebraically, which is easy enough on account of the known simple form of the DSI

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L.a.s. 4 p. 8° Cambridge 19.3.1873
ausführliches wissenschaftliches
Schreiben über die Gleichung:

$$\frac{1-y}{1+y} = \frac{1-x}{1+x} \frac{\alpha - \beta x + \gamma x^2 - \dots}{\alpha + \beta x + \gamma x^2 + \dots}$$

1./
C a y l e y Arthur.- Rechtsge-
lehrter u. Bodlerian Prof. d. rei-
nen Math. an d. Univ. & "Fellow" am
Trinity College in Cambridge,
Mitgl. d. Astron. & Math. Soc. in London,
Mitgl. d. Cambridge Philosophical
Society und d. Royal Society/Or/
/Or 1881/Nekr. v. Fuchs in Crelle,
J. 115 & Lond. Roy. Soc. Proc. 58, m.
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F. M. 26/
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gest. 1895, Jan. 26, Cambridge.
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/Ib. id./ - On certain expansions in
series of multiple sines and co-
sines/Ib. id./ - On the properties
of certain symbolical expression
/Ib. id./ - On certain definite in-
tegrals/Ib. id./ - On Lagrange's theo-
rem/Ib. id./ - Demonstration of
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3./

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